

# RAMCIP: An Advanced Social Robot for Providing Assistance at Home to Older People in Need

Compiled by: Giuseppe Riva, PhD,<sup>1,2</sup> and Eleonora Riva, PhD<sup>3</sup>

This column will try to describe the characteristics of current cyberpsychology research in Europe. In particular, CyberEurope aims at describing the leading research groups and projects running on the other side of the Ocean.

**D**ETERIORATING DEMOGRAPHICS challenge the ability to provide the elderly with care services at home. An EU initiative has addressed the issue by creating an innovative robot to assist those suffering from mild cognitive impairments and dementia.

The old-to-young population ratio in modern societies is increasing. This progressively hinders the capacity to provide proper caregiving services to older people in their daily life at home. Service robots could help in this regard and share some responsibilities with human caregivers. The EU-funded RAMCIP project (<https://www.ramcip-project.eu/>) researched and developed a new service robot to support the elderly with mild cognitive impairments and early Alzheimer's disease in their daily activities at home (for a video, see <https://www.youtube.com/watch?v=pgtygRujsEg>). RAMCIP focused mainly on the "development of a robot with high-level cognitive functions that enable proactive and discreet robot behaviour" says project coordinator Prof. Dimitrios Tzovaras. "The project developed the robot in order to support a series of use cases including assistance provision for daily activities such as cooking eating and medication as well as securing safe handovers." Project partners successfully tackled such key issues as the provision of proactive, discreet, and optimal assistance to the user. To facilitate this, they implemented advanced communication channels between the user and the robot. They also applied state-of-the art means for physical interaction between the robot and the

patient's home environment. The robot's high-level cognitive functions orchestrate a combination of advanced lower-level mechanisms. These enable the robot to communicate with the user, and to establish dexterous and safe manipulations.

## Recognizing Human Action and Behavior Patterns

The researchers developed novel methods for unobtrusive human activity recognition. This was done to allow the robot to identify complex human actions and the behavior of multiple persons in the user's home. The resulting inferences help with the robot's successful execution of daily activities such as cooking and housekeeping, detecting crucial forgotten actions, and emergency cases such as falls. Patient-robot communication is based on touchscreen, speech, and gestural modalities. The technology incorporates an augmented reality display and an underlying empathic communication channel. These innovations permit the robot to sense the effect on the user and to moderate it.

## Step Change in Robotics for Assisted Living

The robot is able to grasp a variety of objects in the home environment safely, ranging from very small items to dishes and cooking utensils. It interacts with home

<sup>1</sup>Department of Psychology, Catholic University of Milan, Milan, Italy.

<sup>2</sup>Applied Technology for Neuro-Psychology Lab, Istituto Auxologico Italiano, Milan, Italy.

<sup>3</sup>Department of Cultural Heritage and Environment, University of Milan, Milan, Italy.

objects or appliances, such as doors, light switches, and ovens. The robot can also fetch objects that cannot be reached by the user. The researchers demonstrated the robot at two major exhibitions in Europe after the project finished. Live demonstrations continue to take place. They are currently looking into ways to commercialize the service robot. “RAMCIP outcomes will stimulate robot users’ socialisation, positive outlook and cognitive training,” Prof. Tzovaras explains. These aspects are considered important factors in facilitating the improvement of older individuals’ quality of life. “Thanks to the RAMCIP robot, patients with mild cognitive impairments or early Alzheimer’s disease will be able to live longer and more independently at their own homes,” he concludes. “This will help to reduce their dependence on the human caregiver, time spent in hospitals and institutionalisation.”

Address correspondence to:  
*Dr. Giuseppe Riva*  
*Department of Psychology*  
*Catholic University of Milan*  
*Largo Gemelli 1-20123 Milan*  
*Italy*

*E-mail:* giuseppe.riva@unicatt.it

*Dr. Eleonora Riva*  
*Department of Cultural Heritage and Environment*  
*University of Milan*  
*Via Festa del Perdono, 7, 20122*  
*Milan*  
*Italy*

*E-mail:* eleonora.riva@unimi.it

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